CHASSIS LUBRICATION
Lubricate for SAFETY every 1,000 MILES

VOLUME VII • NUMBER 8 NOVEMBER, 1943

Car Manufacturers' Recommendations

Keeping Your 1942 Car Up-to-Date

By WALTER E. BLAINE, Chek-Chart Detroit Field Engineer

CHRYSLER

The 1942 Chrysler models are known as the Royal and Windsor 6, C-34; New Yorker and Saratoga 8, C-36; and Crown Imperial 8, C-37.

In reviewing the Chrysler 1942 units it develops that the manufacturer's original lubrication recommendations are such that Government restrictions of certain types of lubricants for civilian cars do not affect the original Chrysler recommendations. The original recommendations for the engines, transmissions and differentials, remain unchanged. What all makes of cars "Need For 1943" is special attention to service that will keep them fit for the duration.

Each make of car has its own individual service peculiarities. Special units require special attention, and in the 1942 Chrysler line are found the Fluid Drive and Vacamatic Transmission. Lubrication service for these units is not complicated, but accuracy as to type of lubricant is important.

FLUID DRIVE

The Fluid Drive operates on the same principle as that which causes one fan to rotate by air blown from another fan facing it which is connected to an electrical outlet. The air blown by the electrically-connected fan strikes the blades of the other fan causing them to rotate.

The actual Fluid Drive unit consists of two parallel facing rotors, each having a set of blades. The mechanism operates in oil. One of the rotors, known as the "impeller," is attached to the crankshaft. The other, called the "runner," connects with the transmission shaft. There is no mechanical connection between the two rotors—the driving force is transmitted entirely by oil. As the impeller rotates, it throws oil across the gap into the runner. This transmits engine power to the runner and so to the rear axle.

SERVICING FLUID DRIVE

Because the Fluid Drive unit is so nearly foolproof, the car owner may entirely overlook the fact that service is required. The manufacturer recommends that after driving a new car 1,000 miles, the level of the special lubricant be checked, then rechecked every 15,000 miles thereafter. Only special "Chrysler Oil for Fluid Drive" should be used and a Chrysler dealer should do the work.

Fluid Drive is standard equipment on Models C-36 and C-37 and is optional on Model C-34.

VACAMATIC TRANSMISSION

(Optional Equipment on Models C-34 and C-36; Standard on C-37)

It is assumed the word "Vacamatic" was derived from a combination of the words vacuum and automatic. Its meaning indicates that certain gear shift positions are accomplished automatically by a vacuum unit. Lack of space does not permit complete details of operation, but at predetermined road speeds, for various speed positions, automatic shifts occur when the driver momentarily lifts his foot from the accelerator pedal.

Where Vacamatic Transmissions are used, the filler plug will be found on the left side of the transmission. This is one way of identifying cars equipped with a Vacamatic Transmission, as the filler plug for standard transmission is on the *right* side. It is *important* that the type of transmission be determined before servicing as the Vacamatic requires an entirely different lubricant (a special oil), than the standard transmission, which requires regular gear lubricants. Both transmission cases look very much alike when looking upwards from under the car. *Make sure* the proper lubricant is used in servicing the individual car in question.

DIFFERENTIAL CAPACITIES AND RECOMMENDATIONS

The lubricant capacity of the Model C-37 is 5 pt. or lb. The capacity of Models C-34 and C-36 is 3¼ pt. or lb. SAE 90HP is recommended for above 0°F. and 80 HP for below 0°F. Drain and refill seasonally, or every 15,000 miles, whichever occurs first.

ENGINE CAPACITIES AND RECOMMENDATIONS

The crankcase capacity for Model C-34 is 5 qt. The capacity for Models C-36 and C-37 is 6 qt. Chrysler continues to recommend SAE 20, 20W for temperatures down to 32°F. For temperatures down to +10°F., No. 20W is recommended, and for temperatures down to −10°F., use No. 10W. Drain after the first 1,000 miles, then every 2,500 to 3,000 miles in summer and every 1,500 to 2,000 miles in winter.

TRANSMISSION CAPACITIES AND RECOMMENDATIONS

The lubricant capacity of all Chrysler Vacamatic transmissions is 2¾ pt. Chrysler originally recommended a special lubricant for this unit, which is still preferred. This

(Continued on Page 3)

NATIONAL LUBRICATING GREASE INST. NLGI

Fatty Acids

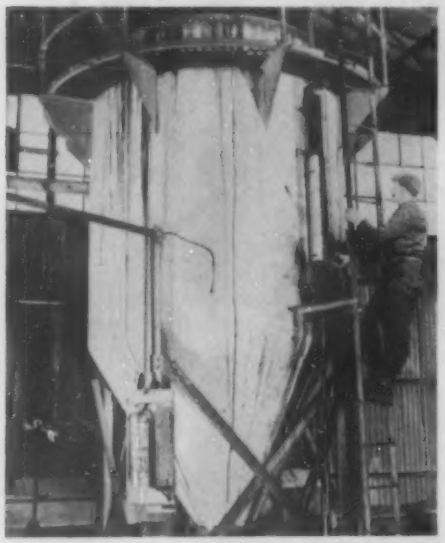
Preparation, Physical and Chemical Properties, Uses in Soaps and Protective Coatings

By A. G. H. REIMOLD, President, Woburn Chemicals, Ltd., Toronto

(Continued from October Issue)

THE TALLOW GROUP

Split Tallow Fatty Acid is rendered and split from various types of beef and mutton fat, by-products from the slaughter houses, etc. Bone grease, house grease, etc., if added, modify the composition and therefore



Workman is adjusting steam valve on an autoclave for splitting tri-glyceride oils. Pressures range from 150 to 350 pounds per square inch.

the chemical data very considerably. Tallow fatty acid may also be supplied in the distilled form with approximately the following constants:

	Titre	*Acid No.*	*Sap. No.*	*Iod. No.*
Tallow F.A.	42	198	200	45
"	40	204	206	55
"	41	202	205	58

The composition analysis of beef and mutton tallow approximate:

Beef Tallow:	Myristic acid	2.0%
	Palmitic acid	29.0%
	Stearic acid	24.5%
	Oleic acid	44.5%
Mutton Tallow:	Myristic acid	2.0%
	Palmitic acid	27.2%
	Stearic acid	25.0%
	Oleic acid	43.1%
	Linolic acid	2.7%

Tallow fatty acid forms a white, hard mass which, if pressed in hydraulic presses under proper conditions, yields *stearic acid*, in various purities, according to the number of pressings and the original appearance of the raw material. The oil part, separated from the stearic acid press cake, constitutes the *red oil* of the trade. The commercial stearic acid contains about even parts of stearic and palmitic acids.

VEGETABLE OLEIC ACID

This fatty acid is a distilled vegetable oleic acid that has extensively replaced animal red oil, because it has been found to produce more stable soaps that have better cleansing properties. It is used extensively in the textile industry.

The average composition is:

Saturated acids	5-10%
Oleic acid	45-50%
Linolic acid	40-45%

This fatty acid shows the following chemical constants:

Acid No.	192-196
Saponification No.	195-198
Iodine value	110-120
Titre	20-24°C

WHITE OLEINE

The distillation product of selected red oils is called white oleine. The strong animal odour of the raw materials has been practically removed or is covered by the distillation odour. This light-coloured liquid distillation product is iron-free and can be used in many textile applications where red oils are undesirable.

Average analysis:

Acid No.	196-200
Saponification No.	199-203
Iodine Value	80-90
Hexabromide Value	0
Titre	Below 10°C
Colour	Very light

White oleine consists mainly of oleic acid, with only small percentages of linoleic and saturated acids present.

SPECIAL LAURIC ACID

This is a special fraction containing about 60 per cent. of lauric acid and shows analyses as follows:

Caprylic and lower acids	About	5.2%
Capric acid	"	9.2%
Lauric acid	"	58.4%
Myristic Acid	"	20.5%
Stearic acid Palmitic acid	"	1.7%
Unsaturated acids	"	1.9%
Unidentified		Diff.

Average of chemical identification data:

Acid No.	270-280
Saponification No.	272-282
Iodine Value	3-6
Titre	25-27°C

TECHNICAL CAPRIC ACID

This fraction is another product from the cocoanut distillation and is higher in the lower molecular weight acids than "straight-run" cocoanut fatty acid. It is a liquid, light-coloured fatty acid used for pigment coating, etc.

The analysis approximates:

Acid No.	300-310
Saponification No.	302-315
Iodine Value	3-7
Titre	13-18°C

TECHNICAL MYRISTIC ACID

A white, crystalline, hard acid:

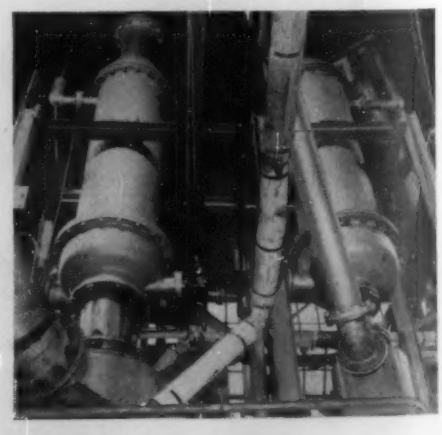
Acid No.	237-243
Saponification No.	240-246
Iodine Value	4-13
Titre	42-46°C
Specific Gravity	0.869 (50°)

The chemical composition approximates:

Lauric acid	About	20%
Myristic acid	"	65%
Palmitic and Stearic	"	5%
Oleic acid	"	10%

COTTONSEED FATTY ACID

In producing this distilled fatty acid from American cottonseed oil, special attention is given to uniform titre and iodine value, as well as lightest possible colour. Cottonseed



In the distillation purification of raw fatty acids, large condensers liquefy vaporized components.

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Car Manufacturers' Recommendations

(Continued from page 1)

is a viscosity range No. 20W oil compounded with 10% sulfur saponifiable base. Since this lubricant may not be available on account of Government restrictions, Chrysler approves an alternate recommendation of a quality grade of Motor Oil SAE 30 above 32°F. and 20W below 32°F., if the preferred lubricant is not available.

The capacity of all standard transmissions is 2¾ pt. or lb. SAE 90 Gear Oil is recommeneded for above −10°F. and 80 for below −10°F. Drain and refill seasonally, or every 15,000 miles, whichever occurs first.

Shock Absorbers on all models are of the telescoping type. In addition to the usual front and rear shocks, there is also a shock absorber on the transverse strut on all long wheelbase models. Proper adjustment and inspection for leaks will assist in correct riding qualities as well as removing hammer shocks that add to wear of all parts of the car. Car owners seldom give any thought to these units and continue to neglect them until failure occurs. They should be checked at least once a year, regardless of mileage.

* * *

Air Cleaners should have periodic attention. Oil bath type is standard equipment on all models. Motor Oil SAE 50 should be used in the oil cup in summer, and 20W in winter. Each time Air Cleaners are serviced, also clean the crankcase oil filler tube cap, and dip in oil before replacing.

* * *

Universal Joints are of the needle bearing type and are packed at assembly. As special tools and new seals are necessary to disassemble the unit for lubrication, the work should be done by a Chrysler dealer. There is no visible way of determining when Universal Joints should be lubricated. Chrysler recommends that cars equipped with Cross type needle bearing universal joints be lubricated by a Chrysler dealer every 15,000 to 20,000 miles.

Long wheelbase models are equipped with a propeller shaft bearing, requiring Wheel Bearing Grease through a fitting every 6,000 miles. Model C-37 has three Universal Joints. Both of the above points might be neglected unless the mechanic is thoroughly familiar with all models. Universal Joint Splines require Chassis Lubricant through a fitting every 2,000 miles.

A Brake Vacuum Cylinder is standard equipment on Model C-37. The servicing of this unit should be done by a Chrysler dealer.

* * *

Oil Filters on the 1942 models are of the "sealed-in" filter type. In renewing the element it is necessary to replace the entire unit. Filters become clogged in time, depending on operating conditions. The car owner pays little attention to the filter because there is no visible means, except possibly the color and condition of the Motor Oil, of knowing whether the filter is clogged or not. The oil is by-passed to the engine bearing when the filter fails to function. To be on the safe side, and to keep the engine in pink of condition for the duration, Chrysler suggests that engines run more than 8,000 miles should be brought in to the dealer for filter inspection and renewal, if necessary. The filter should be renewed on engines "dosed" with a carbon-removing sludge solution as the released carbon, sludge or other foreign substances will completely clog the filter.

CHASSIS POINTS AND PRESSURE FITTINGS

All front axle points, such as Control Arm Shafts, Spindle Supports and Tie Rod Ends require Chassis Lubricant every 1,000 miles. On the left side of center of the chassis fittings are provided for the Torque Shaft, Gear Shift, Control Shaft, and Pedal Shaft. These also require Chassis Lubricant, but only every 6,000 miles instead of 1,000 miles.

Other 6,000 mile interval points are the Generator, Wick under Rotor, and Starter, which require Motor Oil. Note that these are electrical unit points, and a 6,000 mile interval is recommended to avoid over-lubrication. A 6,000 mile interval also applies to the Steering Gear.

FORD

Passenger cars produced by the Ford Motor Company in 1942 include the Ford 6, Ford V-8 DeLuxe and Super DeLuxe. The identifying manufacturer's starting serial number for all units is located on left frame side member just back of front engine support.

INFORMATION COMMON TO BOTH 6 AND V-8's

All lubrication points, fittings, oilers, etc., are readily accessible and the possibility of neglecting to properly lubricate all points with the correct lubricant at the proper interval is remote.

Metal spring covers are used on most models. Three lubricating fittings are used on both front and rear springs which require a Special Ford Spring Lubricant, or a Ford approved lubricant meeting Ford's specifications. Since the fittings used are of the same type as other grease gun fittings used on the car, it is very easy for the operator to apply the regular Chassis Grease instead of the Special Ford Spring Lubricant recommended, the grease gun type of fitting being a natural invitation to use grease. Grease will eventually clog up the passages between the spring leaves, and stiff spring action will become more and more pronounced. The use of the Special Ford Spring Lubricant not only keeps the passages for the lubricant open, but assures a smoother, softer ride at all times.

Both the wire gauze and the oil bath types of air cleaners, of various makes, will be found on Ford units. Intervals for servicing air cleaners varies with operating conditions. The oil bath type air cleaner re-

quires the same grade of oil as used in the engine crankcase. Fill the oil cup to bead level.

The crankcase oil filler cap is provided with an integral air cleaning element which should be cleaned at regular, frequent interval.

Rear wheel bearings are lubricated with Wheel Bearing Grease through a fitting, using a *hand gun only*. Apply sparingly to avoid over-lubrication. Excess grease may work through to the brakes, causing slippage.

Only two different intervals for applying lubricant to the various chassis points are used on both the "6" and "V-8" 1942 models, 1,000 and 5,000 miles. However, since restrictions on mileage of cars have been established, it is good practice to lubricate chassis points every 60 days or every 1,000 miles, whichever occurs first.

Front and rear wheels, fan on the "V-8", and transmission and differential units should be serviced every 5,000 miles.

CAPACITIES AND LUBRICANTS RECOMMENDED FOR BOTH "6" AND "V-8" MODELS

The crankcase refill capacity of both the "6" and "V-8" is 5 qt. SAE 30 grade is recommended above +32°F., SAE 20, 20W down to +10°F., and SAE 10W down to −10°F. Drain every 2,000 miles, or seasonally.

The transmission capacity is 2¾ pt. or lb. on both the "6" and "V-8". SAE 90EP above +32°F., and SAE 80EP below +32°F. were Ford's original recommendations. However, on account of the Government restricting Extreme Pressure lubricants for use in civilian passenger car transmissions regular Mineral Gear Oil of the SAE 90 and SAE 80 grades may be substituted. Drain every 5,000 miles or seasonally, whichever occurs first.

The differential capacity is 2½ pt. or lb. on both the "6" and "V-8". Since Extreme Pressure Gear Lubricant is permissible for use in rear axles, SAE 140EP is used above +32°F., and SAE 90EP below +32°F. Below 0°F. use SAE 80EP. Drain every 5,000 miles or seasonally, whichever occurs first.

MISCELLANEOUS POINTS

Universal joints should be serviced with Universal Joint Grease every 1,000 miles.

On the "V-8" models the fan is lubricated with Motor Oil every 5,000 miles by turning the fan until the plug in the hub is at the top, remove plug and add 1 oz. of SAE 20 Motor Oil. Turn hole to bottom to drain out excess oil, holding cloth over plug hole to prevent oil getting on pulley or belt, then replace plug.

The generator on "V-8" models has one oiler at the rear end. On the "6" the generator requires oiling only on some early 1942 produced models.

On steering gears, on all models, the lubricant level should be inspected monthly. Keep filled with SAE 90EP Gear Oil year round.

Tire inflation recommended pressure is 28 lb., but on account of rubber conservation it has become almost a universal practice to increase pressures slightly. While Ford has issued no special instructions to its service divisions on this subject, it is likely that pressures are automatically being somewhat increased.

1942 CHEVROLET ½, ¾ TON TRUCK LUBRICATION

The 1942 ½ ton Chevrolet trucks are known as Models BJ and BK. The BK is also known as the "Light" delivery (½ ton), and the BJ as the "Dubl-Duti" model. Lubrication for both models is practically identical.

The 1942 ¾ ton models are known as BL (¾ ton), BM (¾ ton heavy duty), and BN (¾ ton special). The lubrication details for all ¾ ton models vary slightly, and are quite similar to those of the ½ ton models.

CRANKCASE LUBRICATION

Capacity of the crankcase is 5 qt. and the recommended grades of Motor Oil are SAE 30 for temperatures above 90° F., SAE 20 or 20W for temperatures down to 32°F, SAE 20 W down to +10°F, and SAE 10W down to −10°F.

The oil bayonet has a "Full" mark and an "Add Oil" mark. The oil level is to be maintained between these lines, and the crankcase drained at 2,000 to 3,000 miles under normal driving conditions. Unusual operation conditions, such as operation in dusty air conditions, requires more frequent draining.

Trucks engaged in city delivery operations, where daily mileage is short, and there are many starts and stops, may require exceedingly frequent changes. These are conditions similar to those encountered in passenger car operation under wartime driving conditions.

"Short runs in cold weather, such as city driving, do not permit thorough warming up of the engine and water may accumulate in the crankcase from condensation of moisture produced by the burning of the fuel," the Owner's Manual states.

"Water, in the crankcase may freeze and interfere with proper oil circulation. It also promotes rusting and may cause clogging of

oil screens and passages. Under normal driving conditions this water is removed by the crankcase ventilator. But if water accumulates it should be removed by draining the crankcase as frequently as may be required."

The Manual also advises owners to "change oil regularly, using only high-grade engine oil of the correct viscosity."

The crankcase should be drained while the oil is hot, to empty the case quickly and thus remove suspended foreign materials.

Wheel Bearings

Front wheel bearings on cab-over-engine models have "Barrel" type roller bearings and should be packed with No. 2½ Cup Grease. On other models the front wheels have ball bearings, requiring Wheel Bearing Grease. The service interval is 10,000 miles.

Front wheel bearings are to be removed, cleaned and repacked, but "the hub between the inner and outer bearing assemblies, or the hub cap is not to be packed with lubricant" as this excessive lubrication results in the lubricant working out into the brake drum and linings.

A wrench, no larger than 8 in., is to be used in mounting the front wheels, with a steady one-handed pull to adjust the nut as tight as possible while rotating the wheel to seat all parts. Then the adjusting nut is to be backed off one-half castellation, or one-twelfth turn. If the cotter pin hole and nut do not line up then the nut is to be backed off until the slot and hole are in line.

"Front wheel bearings should never be set up on the loose side, as such an adjustment does not bring the balls and races into proper contact," the Manual states.

Lubricant for the rear wheel bearings comes from the rear axle.

The steering gear case should be inspected every 1,000 miles, and Steering Gear Lubricant added as necessary. Over-lubrication forces lubricant up the steering gear tube.

The starter has an oiler at the front end, and a few drops of light Motor Oil should be put in the cup every 1,000 miles. The generator has an oil cup at each end, and takes a few drops of light Motor Oil also each 1,000 miles. The distributor has a grease cup, which is to be filled with Chassis Lubricant each 1,000 miles, and turned down one full turn every few days.

A lubrication point often overlooked is the carburetor accelerating pump shaft. The dust cover must be removed to reach the felt ring on the carburetor pump lever shaft which is to be saturated with Motor Oil every 5,000 miles.

On cab-over-engine models, stand-pipes are provided for lubrication of the steering gear and front and rear generator bearings.

Power Transmission

A 4-speed transmission is optional equipment on all models and the capacity is 5½ pt. or lb., against a capacity of 1½ pt. or lb. for the regular transmission. The lubricant recommendation is regular Mineral Gear Oil, SAE 80 for below zero, SAE 90 above zero, and SAE 140 for above 32°F. under severe operating conditions. The gear box fill plug is on the left side for regular transmissions, and on the right side for 4-speed transmissions. The transmission is to be drained every 6,000 miles.

The standard chassis has three universal joints, front for BN models only, center, and rear, each with a fitting to be serviced every 1,000 miles with Fluid Gear Lubricant, SAE 90. There also is a universal joint spline near the center of the propeller shaft, with a fitting to be serviced each 1,000 miles with Chassis Lubricant.

Hypoid Gear Lubricant is recommended for the differential, which has a capacity of 4½ pt. or lb. The grades recommended are SAE 80HP for below zero, and SAE 90HP for above zero.

Chassis and Springs

All points equipped with ball end fittings on all models should be serviced with Chassis Lubricant every 1,000 miles by means of the pressure gun. At the front of the chassis on both sides there are spring shackles, two fittings, the king pin, tie rod, spring bolt. There are two fittings on the drag link.

At the rear of the chassis there is a spring bolt, forward, on both sides, and two fittings at the rear spring shackle. The rear spring saddles on the ¾ ton models require no lubrication while the ½ ton models are equipped with a fitting which requires Chassis Lubricant.

Springs should be sprayed with Motor Oil if hard riding occurs, or the springs begin to rust.

Lubrication information given above applies to factory production models, and not to special units that may be installed.

Before starting lubrication on the power transmission, service men should check the vehicle. The listings given above, and on the CHEK-CHART Truck Lubrication Charts are for standard, factory equipped jobs. In some cases alterations have been made, and other equipment installed to meet specific conditions of truck operation. A different transmission or differential may be installed, and where the chassis is lengthened there may be additional Universal Joints and Splines.

(Continued from page 2)

fatty acid is widely used for lacquer type alkyd resins (to be used in nitrocellulose lacquers) but its high content of palmitic acid limits more universal application. As small amounts of animal stearic acid seem to cause a seeding effect, contamination by animal fats has to be avoided. Chemical analysis would hardly disclose such contamination which distinctly shows in the film.

The average chemical composition is:

Saturated acids	23-30%
Oleic acid	35-45%
Linolic acid	30-40%

The average analysis is:

Acid No.	198-202
Saponification No.	200-204
Iodine Value	90-110
Titre	36-38 °C
Hexabromide Value	0

SYNTHETIC DRYING OILS

The most outstanding recent development allied with fatty acids lies in the field of synthetic drying oils. Of these, two are outstanding—dehydrated castor oil, and the isomerized oils with conjugated double bond structure.

Dehydrated castor oil is supplied as a high-quality, light-coloured oil, and is especially distinguished by its low acid number and absence of odour. It shows some of the characteristics of tung oil, without being over-active. It has little auto-oxidation, and decreased polymerization activity, compared with tung oil. Therefore, no premature loss of adhesive power and elasticity, or early destruction of the coating, takes place.

Dehydrated castor oil can be blended and combined with the other regular materials on the varnish maker's shelf, such as chinawood oil, linseed oil, synthetic resins, etc., and there are no difficulties if prolonged cooking of the oil in the presence of acidic resin material is avoided.

The ability of this product to harden and dry is less pronounced than that of tung oil, due to the presence of only two conjugated double bonds in the 9 and 11 positions in the molecule. Bodied to the viscosity of Litho Varnish No. 3, it can be made to dry in 3 hours by the addition of 0.01 per cent. cobalt and 0.1 per cent. of lead.

It makes a decided difference whether the unsaturated molecules of a drying oil are conjugated or isolated systems of active double bonds as shown by the time necessary for the film formation and the total weight change occurring in the film. Fatty oil complexes containing only the unsaturation of isolated double bonds exert less effect on the drying power.

Another remarkable feature of this oil is its wetting power on pigments when the untreated oil is ground with the pigments. It is said to be possible to get at least 33⅓ per cent. more pigment into the vehicle than with a similar weight of linseed oil.

SHIFTING THE DOUBLE BOND

Recent work has been on conjugated oils where new processes have effected a shifting of isolated double bonds to form conjugated double bond structures. Thus conjugated soyabean fatty acid, conjugated linseed fatty acid, etc., have been produced and represent a new class of raw materials.

This molecular rearrangement results in a remarkable change in properties. Foremost, is the speed of polymerization of the esters. The difference in polymerizing tendency between the natural and the conjugated fatty acid esters is strikingly illustrated by a comparison of the gelation times of a triglyceride of conjugated linseed fatty acid and a linseed oil of similar viscosity.

	Bodied Triglyceride of Conjugated Linseed F.A.	Linseed F.A.
at 540 F.....	34 minutes	5 hours
at 600 F.....	12 minutes	113 minutes

Checking the viscosity of oils during their conversion to synthetic drying oils.

Fatty acids offer unusual advantages for the preparation of alkyds. Due to their ability to polymerize rapidly at moderate heat, medium and long oil length alkyds of high viscosity may be prepared in very much shorter time than is possible with the corresponding natural (distilled or "split") fatty acids. The cooking time of the ordinary fatty acids in alkyd manufacture may be reduced one-half or more by replacing in part with the conjugated acids.

Alkyds made from conjugated fatty acids have greater thermosetting speed than alkyds made from the corresponding natural fatty acids and they require shorter baking times. Tests indicate that this difference in baking speed is greater the higher the temperature of baking. However, at ordinary temperature, *i.e.*, on air drying, the conjugated alkyds are somewhat faster than those made from the natural acids, although not in proportion to their increased bodying and thermosetting tendencies.

It is, of course, necessary to insure complete esterification if these potentially faster air-drying properties of the conjugated acids are to be attained. In the case of short oil

alkyds, this requires special precautions because the increased activity of the conjugated double bonds may cause gelation before the acid value has been sufficiently reduced. It may be found necessary in the shorter oil-lengths, especially with conjugated linseed fatty acids, to counteract this tendency by adding a certain percentage of more slowly polymerizing fatty acids or by modifying with rosin or other retarding agents.

No such precautions are required with long oil alkyds of conjugated fatty acids, and it is in these longer oil formulations that the cooking speed of the new fatty acids is of particular advantage. It has been found possible to go to much greater oil-lengths than is possible with the natural fatty acids and still obtain highly viscous products in cooking periods of normal duration. This is demonstrated by alkyd No. *P-401*, a long-oil conjugated soyabean fatty acid alkyd of high viscosity. In this alkyd the weight of fatty acids was one and one-half times that of the phthalic anhydride, and when natural (distilled) soyabean fatty acids were substituted for the conjugated soyabean fatty acids, it was impossible to match the viscosity of *P-401* even after extending the cooking time by over 200 per cent. and raising the temperature.

Films of the conjugated fatty acid alkyds differ somewhat in their properties from those of the natural fatty acid alkyds, due to the influence of the conjugated double bond system on the drying mechanism. The hardness of air dried and baked films is somewhat better than that of the corresponding natural fatty acid alkyds. On the other hand, the tendency to wrinkle and gas-check is greater than with the natural fatty acids, which is a typical property of conjugated double bonds. The experienced alkyd maker, who has used tung oil in alkyds, will not find it difficult to overcome this tendency.

Various other fatty acids, such as those of sardine oil, walnut oil, sunflower oil, etc., may be converted into the corresponding conjugated fatty acids and new applications are being developed which presages increased use in the future.

Average Characteristics:	Conjugated Soyabean F.A.	Conjugated Linseed F.A.
Acid Value	198.0-199.5	197.5-199.0
Saponification Value	198.5-199.5	198.5-199.5
Ester Value	0-1	0-1.5
Hexabromide Value	0-1	0-3
Wijs Iodine Value (400% excess)	112-118	143-157
Total Iodine Value (Woburn Method)	136 Minimum	176 Minimum
Instantaneous Iodine Value (Wijs, 3 min. on ice)	88 Minimum	115 Minimum
Conjugation by difference (Woburn Diene Value)	40 Minimum	55 Minimum
Titre	18-22	18-24
Specific Gravity	0.9138 (20°C.)	0.9201 (25°C.)
Viscosity	A to B	A to C
Colour	2L-4	2L-4